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09/784,392

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10/30/2006

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EXAMINER

WONG, LESLIE

ART UNIT

PAPER NUMBER

2164

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/784,392

Applicant(s)

PEDERSON ET AL.

Examiner

Leslie Wong

Art Unit

2164

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-9, 17-31, 34-35, 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada et al. (hereinafter "**Tada**" 5,544,359) in view of **Debrunner** (U.S. Patent US 6321234 B1).

As per claims 1, 21, 24 **Tada** discloses a method of performing a transaction in a database system, comprising:

receiving a transaction to be performed (Tada, col. 1, lines 23-27);

performing a flush of a transaction log from volatile storage to non-volatile storage by an access module (Tada, Fig. 5, col. 11, line 30 – col. 12, line 3, the flush operation S10 is performed before the end transaction procedure S14).

**Tada** does not explicitly disclose “before any directive indicating commencement of an end transaction procedure is broadcast to the access modules”.

**Debrunner**, however, teaches “before any directive indicating commencement of an end transaction procedure is broadcast to the access modules” as the PLS containing log records describing a change to such as page are flushed before the end of the transaction (col. 9, lines 20-26).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of the cited references because **Debrunner's** teaching would have allowed **Tada's** to reduce contention for the log semaphore and increases transaction throughput of the database server system as suggested by **Debrunner** col. 9, lines 25-26 and abstract.

As per claim 2, Tada further teaches issuing a request to flush the transaction log with a message sent (Tada, Fig. 5, step S06) to each access module for performing a last step of the transaction (Tada, Fig. 5, step 11), the last step performed prior to the end transaction procedure (Tada, Fig. 5, the last step of transaction S11 checks whether the logs are flushed before the end transaction procedure S14).

As per claim 3, Tada further teaches performing the flush of the transaction log in a data access step prior to the end transaction procedure to avoid performance of a transaction log flush in the end transaction procedure (Tada, Fig. 5, the flush S10 is performed before the end transaction procedure S14. Since the logs are flushed before the end transaction S14, S14 initializes the transaction end indication and avoids the flush again).

As per claim 4, Tada further teaches determining that the last step (Tada, Fig. 5, S11, S11-1) is being performed by all of the plurality of access modules involved in the transaction (Tada, col. 11, 46-55, step S11 and S11-1 determines whether all logs are flushed).

As per claim 5, Tada further teaches determining if the transaction log has been flushed before performing the end transaction procedure (Tada, Fig. 5, col. 11, lines 47-67, in figure 5, step 11 and S11-1 checks whether the log has been flushed before performing the end transaction procedure S14).

As per claim 6, Tada further teaches avoiding performance of a transaction log flush in the end transaction procedure if the transaction log has been flushed (Tada, Fig. 5, the flush is performed at step S10 which is before the end transaction step S14. S14 just initializes the transaction end indication and avoids the flush again).

As per claim 7, Tada further teaches performing database transaction, which inherently includes an implicit transaction (an implicit statement is a single SQL statement, a transaction performed in the database system inherently includes transaction that only involves a single SQL statement).

As per claim 8, Tada further teaches performing the end transaction procedure (Tada, Fig. 5, step S14), which follows execution of the transaction (Tada, Fig. 5, col. 11, lines 30-67).

As per claim 9, Tada further teaches skipping broadcast of a directive indicating commencement of the end transaction procedure to the plurality of access modules (Tada, Fig. 5, the end transaction procedure S14 skips the broadcasting, it just initialize the transaction end indication).

As per claim 17, Tada teaches all subject matters which corresponds to claim 1 and further teaches a plurality of storage media, the storage media comprising persistent storage and volatile storage (Tada, Fig. 4, col. 7, line 44 – col. 8, line 67).

Claim 18 is rejected on grounds corresponding to the reasons given above for claim 1.

As per claim 19, Tada further teaches the controller adapted to skip sending a directive to perform a transaction log flush if the controller determines that each access module has flushed the transaction log before commencement of the end transaction procedure (Tada, Fig. 5, step S11 and S11-1 determines whether logs are flushed, if flushed, not more flush afterwards).

As per claim 20, Tada further teaches a controller adapted to provide a flush directive (Tada, Fig. 5, S06) with a message to each of the access modules to perform a last step of the transaction before the end transaction procedure (Tada, Fig. 5, the end transaction procedure is S14).

As per claim 22, Tada and Gray teach all the claimed subject matters as discussed in claim 21, and further teach perform the end transaction procedure, wherein the end transaction procedure follows execution of the last step of the transaction (Tada, Fig. 5).

Claim 23 is rejected on grounds corresponding to the reasons given above for claim 9.

As per claim 25, Tada further teaches wherein writing the log to persistent storage comprises flushing the log (Tada, Fig. 5, col. 11, lines 30-67).

As per claim 26, Tada further teaches maintaining the log comprises maintaining a transaction log (Tada, col. 7, line 44 – col. 8, line 67).

As per claim 27, Tada further teaches performing the end transaction procedure, the end transaction procedure comprising writing an end transaction indication into the log (Tada, col. 11, line 65 – col. 12, line 3).

As per claim 28, Tada further teaches providing a directive with a message to perform a last step of a transaction and communicating the directive to the access modules, each access module responsive to the directive to perform a transaction log flush before performance of an end transaction procedure (Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, step S06 issues a message to flush log, step S10 flushes logs, both operations are performed before the end transaction procedure S14); and determining if each of the access modules has performed a transaction log flush before start of the end transaction procedure (Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, step S11 and S11-1 determines whether logs are flushed before the end transaction procedure S14); the parsing engine adapted to avoid sending a broadcast directive to the access modules to cause performance of a transaction log flush during the end transaction procedure (Tada, Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, since the logs are flushed before the end transaction procedure S14, S14 avoids broadcasting flush message again, it just initialize the transaction end indication).



**Tada** does not explicitly disclose “before any directive indicating commencement of an end transaction procedure is broadcast to the access modules”.

**Debrunner**, however, teaches “before any directive indicating commencement of an end transaction procedure is broadcast to the access modules” as the PLS containing log records describing a change to such as page are flushed before the end of the transaction (col. 9, lines 20-26).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of the cited references because **Debrunner's** teaching would have allowed **Tada's** to reduce contention for the log semaphore and increases transaction throughput of the database server system as suggested by **Debrunner** col. 9, lines 25-26 and abstract.

As per claim 29, Tada further teaches performing the plural steps prior to performing the end transaction procedure, and wherein performing the flush of the transaction log comprises performing the flush of the transaction log in one of the plural steps (Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, a plurality of steps S02 and S10 are performed before S14. S10 flushes logs).

As per claim 30, Tada further teaches performing, in each of the plural steps, access of relational table data stored in the database system (Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, S02 read DB, S10 flush log access relation table data).

As per claim 31, Tada further teaches performing the flush of the transaction log in one of the plural steps comprises performing the flush of the transaction log in a last one of the plural steps (Tada, Fig. 5, step S10 perform flush, col. 10, line 9 – col. 12, line 3).

As per claim 34, Tada further teaches the access modules to perform a transaction comprising plural steps, one or more of the access modules adapted to perform the plural steps prior to the end transaction procedure, and the access modules adapted to perform the flush of the transaction log in one of the plural steps (Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, step S10 flushes logs).

As per claim 35, Tada further teaches the one of the plural steps comprises a last one of the steps (Tada, Fig. 5, col. 10, line 9 – col. 12, line 3, step S11).

As per claim 38, Tada further teaches a controller to determine whether a last one of the steps involves all the access modules, and in response to determining that the last one of the steps involves all the access modules, the controller to send a directive to all the access modules to perform the flush of the transaction log in the last one of the steps (Tada, Fig. 5).

As per claim 39, Tada further teaches in response to determining that the last step does not involve all access modules, the controller to send a directive to perform the flush of the transaction log in the end transaction procedure (Tada, Fig. 5).

Claims 40-41 are rejected on grounds corresponding to the reasons given above for claims 29-31.

3. Claims 10-16 and 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada et al. (hereinafter "Tada" 5,544,359) in view of Gray, J. and Reuter (hereinafter "Gray", Gray, J. and Reuter, A. "Transaction Processing: Concepts and Techniques", Morgan-Kaufman, CA. 1993).

As per claim 10, Tada discloses a method of performing an end transaction procedure in a database system, comprising:

After commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion, the first access module being part of a cluster of access module (Tada, Fig. 5, step S12, col. 11, lines 57-61).

Tada does not explicitly disclose the first access module sending an end transaction directive to a fallback module associated with the first access module, the fallback module being part of the cluster.

Gray, however, teaches the first access module sending an end transaction directive to a fallback module associated with the first access module, the fallback module being part of the cluster (Gray, page 34, 61-62, 562-576, 943, the end transaction directive will be sent to its replicated copy at the fallback module in a distributed processing environment).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Tada by incorporating a fallback module as disclosed by Gray (Gray, page 34) and sending an end transaction directive to the fallback module (Gray, page 562-576, 943). Because the fallback module stores a replicated data in other database, this provides continuous service even when one copy of data is corrupted, and sending an end transaction directive to the fallback module ensures the data in the fallback module is consistent with the primary copy of data. The ordinary skilled artisan would have been motivated to modify the database system of Tada for the purpose of be able to providing continuous service even when some data is corrupted.

As per claim 11, Tada and Gray teach all the claimed subject matters as discussed in claim 10, and further teach the first access module sends the end transaction directive to the fallback module but not to other access modules in the cluster (Gray, page 34, 556-576, 592-609).

As per claim 12, Tada and Gray teach all the claimed subject matters as discussed in claim 10, and further teach sending the end transaction directive comprises sending an end transaction-part one directive (Gray, page 34, 556-576, 592-609).

As per claim 13, Tada and Gray teach all the claimed subject matters as discussed in claim 12, and further teach the first access module broadcasting an end transaction-part two directive to all access module in the cluster (Gray, page 34, 556-576, 592-609).

As per claim 14, Tada and Gray teach all the claimed subject matters as discussed in claim 10, and further teach the fallback module writing an end transaction indication to a second transaction log portion (Gray, page 34, 556-576, 592-609).

As per claim 15, Tada and Gray teach all the claimed subject matters as discussed in claim 10, and further teach the first access module flushing the first transaction log portion from volatile storage to non-volatile storage (Tada, Fig. 5, lines 11, lines 30-67, step S10).

As per claim 16, Tada and Gray teach all the claimed subject matters as discussed in claim 10, and further teach the first access module flushing the first transaction log portions but the other access modules in the cluster not flushing their respective transaction log portion (Gray, page 34, 556-576, 592-609).

As per claims 42-43, Tada and Gray teach all the claimed subject matters as discussed in claim 41, and further teach storing instructions for enabling a processor-based system to cause each access module to add a first entry to the transaction log to redo the transaction by the access module in case of system failure (Gray, 559-561, 567).

4. Claims 32-33 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada et al. (hereinafter "Tada" 5,544,359) in view of **Debrunner** (U.S. Patent US 6321234 B1) and further in view of Gray, J. and Reuter (hereinafter "Gray", Gray, J. and Reuter, A. "Transaction Processing: Concepts and Techniques", Morgan-Kaufman, CA. 1993).

As per claim 32, Gray teaches all the claimed subject matters as discussed in claim 31, and further teaches each access module adding a first entry to the transaction log to redo the transaction by the access module in case of system failure (Gray, page 556-576, 592-609).

As per claim 33, Gray teaches all the claimed subject matters as discussed in claim 4, and further teach performing the flush of the transaction log in the end transaction procedure if the last step is not performed by all of the plurality of access

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modules (Gray, page 556-576, 592-609, commit\_work flushes transaction log if the log is not empty/flushed).

As per claim 36, Gray further teaches the transaction log comprises a first entry associated with each access module to enable a redo of the transaction in case of system failure (Gray, page 556-576, 592-609).

As per claim 37, Gray further teaches all the claimed subject matters as discussed in claim 36, and further teaches a second entry associated with each access module to enable an undo of the transaction (Gray, page 556-576, 592-609).

### ***Response to Arguments***

5. Applicant's arguments filed 08/21/2006 have been fully considered but they are not persuasive.

Applicant argues that the Office admits that Tada does not teach or suggest flushing a transaction log from volatile storage to non-volatile storage before any directive indicating commencement of an end transaction procedure is broadcast to a plurality of access modules as required by Applicant's claims 1, 17, 21, 24, and 28. Further, Applicant pointed out that the above described log flush of Debrunner is "from the private log cache of a task to the log page chain. As such, the recited portions of Debrunner teach flushing a log from volatile (PLC) to volatile storage (Log page chain) and that Applicant is unaware of any portion of Debrunner teaching or suggesting a

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directive indicating commencement of an end transaction procedure broadcast to a plurality of access modules, let alone performing a transaction log flush from volatile to non-volatile storage before any such directive is broadcast as is also required by Applicant's claims.

In response to the preceding arguments, Examiner respectfully submits that as an initial matter Debrunner was not cited for the teaching of the limitation "performing a flush of a transaction log from volatile storage to non-volatile storage by an access module"; but it was Tada's teaching that was cited for the above limitation. Therefore, Applicant arguments are irrelevant. The previous office action dated 18 March 2006 states as follows:

**Tada** teaches performing a flush of a transaction log from volatile storage to non-volatile storage by an access module (Tada, Fig. 5, col. 11, line 30 – col. 12, line 3, the flush operation S10 is performed before the end transaction procedure S14).

**Tada** does not explicitly disclose "before any directive indicating commencement of an end transaction procedure is broadcast to the access modules".

**Debrunner**, however, teaches "before any directive indicating commencement of an end transaction procedure is broadcast to the access modules" as the PLS containing log records describing a change to such as page are flushed before the end of the transaction (col. 9, lines 20-26).

Tada teaches the limitation "flushing a transaction log from volatile storage to non-volatile storage". Tada does not explicitly teach the limitation before any directive indicating commencement of an end transaction procedure is broadcast to the access



modules and Debrunner filled in the missing feature of the claim "before any directive indicating commencement of an end transaction procedure is broadcast to the access modules". As a result, the combination of Tada and Debrunner teach the limitation as claimed.

Further, Applicant argues that Applicant is unaware of, and the Office has not pointed out, any sections of Gray that teach a first access module sending an end transaction directive to a fallback access module associated with the first access module, as required by Applicant's claim 10. As such, neither Tada or Gray, taken alone or in combination, teaches or suggests all of the limitations of Applicant's claim 10.


In response to the preceding arguments, Examiner respectfully submits that Gray teaches the limitation "a first access module sending an end transaction directive to a fallback access module associated with the first access module " as when a process checkpoints to its backup, the current list of transactions is included in the checkpoint, so that both members of the process pair are participants in the transaction. If the transaction aborts, or if the primary process fails, the terminal context is returned to its initial state (both the primary and backup have a copy of this) Page 942, second paragraph. Any participant of a transaction can call AbortTransaction(). This spawns a backout process, which flushes the log buffers of all disk servers and initiates an UNDO scan of the log Page 944, section Recovery Manager. Examiner submits that the combination of Tada and Gray would have arrived at the claimed invention.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leslie Wong whose telephone number is (571) 272-4120. The examiner can normally be reached on Monday to Friday 9:30am - 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, CHARLES RONES can be reached on (571) 272-4085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Leslie Wong  
Primary Patent Examiner  
Art Unit 2164

LW  
October 26, 2006